

Caltrans Storm Water Research and Monitoring Program

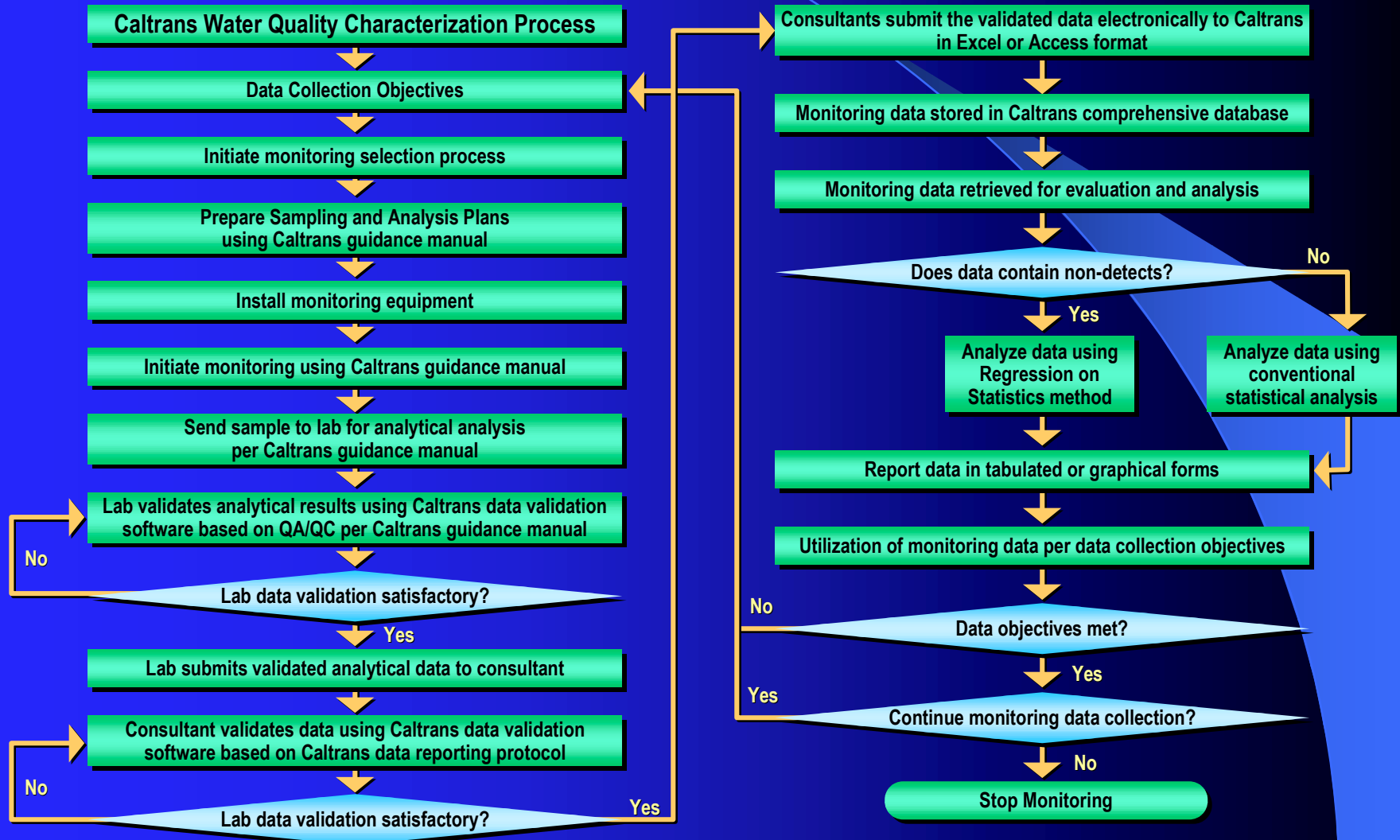
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Acknowledgements

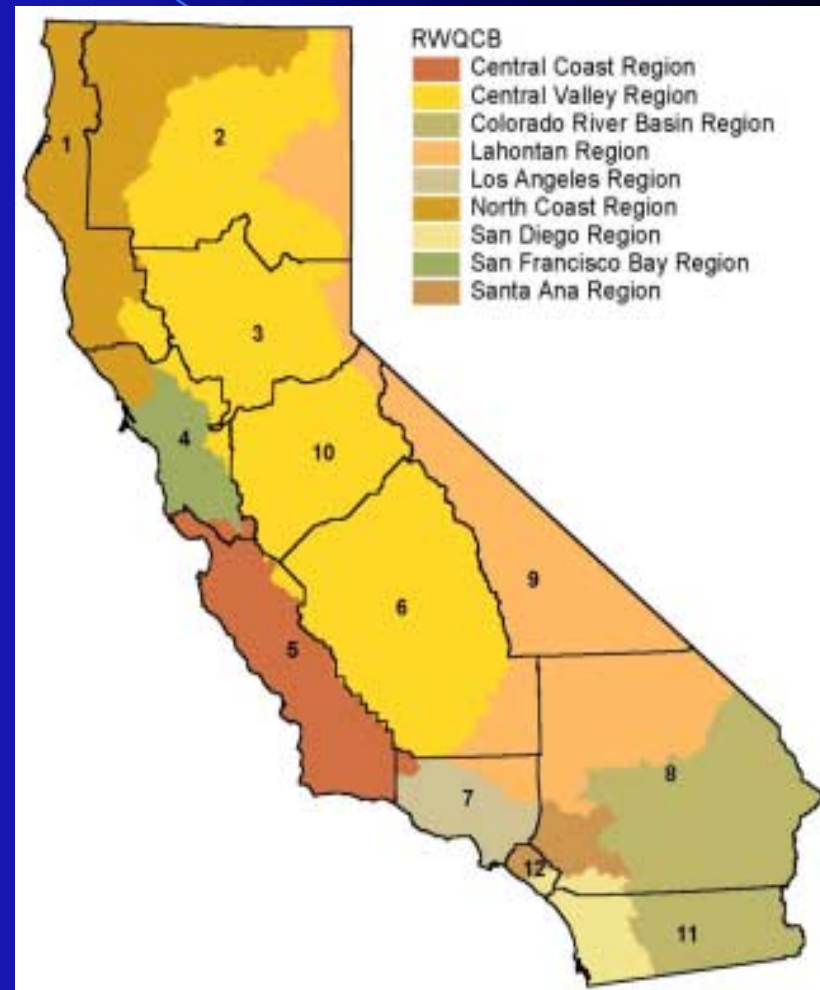
- My Colleagues from Caltrans Division of Environmental Analysis, Universities of California and California State Universities Research Teams, and Consultant Teams.
- All monitoring team members who participated in water quality research and monitoring program.

Overview of Caltrans Stormwater Monitoring Program



Caltrans NPDES Permit

- Prior July 1999 Caltrans NPDES Permit
- Current Caltrans Statewide NPDES Permit
- Caltrans Statewide Stormwater Monitoring Program was initiated to partially satisfy current NPDES requirements



Caltrans Storm Water Monitoring Program

Caltrans storm water monitoring program can generally be grouped as:

- Facility-Based
- Specialized (Constituent-Based)

Facility-Based Monitoring

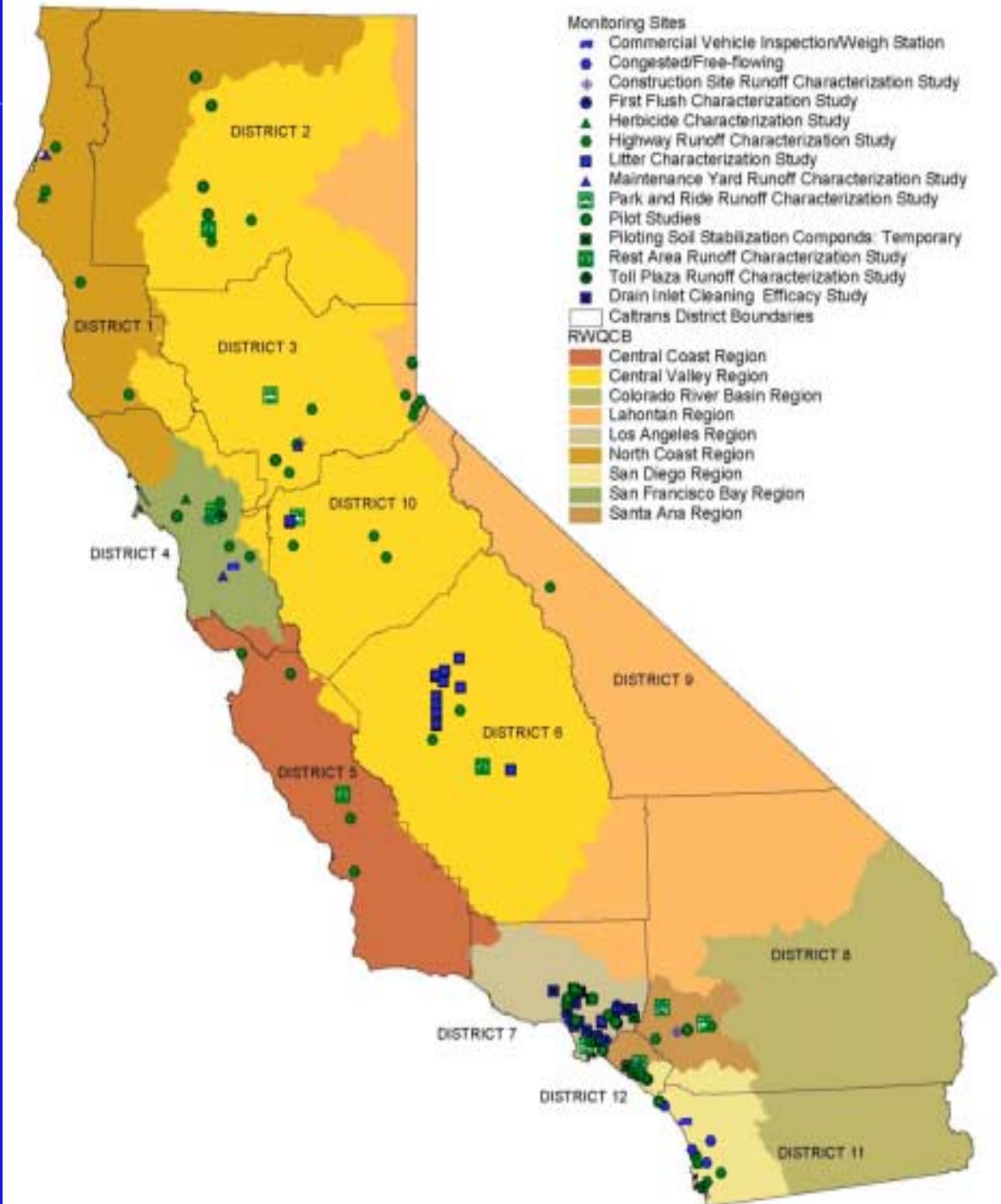
- Highways Including Congested/Free Flowing
- Construction Sites
- Maintenance Stations
- Park and Rides
- Rest Areas
- Toll Plazas
- Weigh Stations

Specialized (Constituent-Based) Monitoring

- Litter
- First Flush
- Pathogen
- Toxicity
- CTR
- Herbicides

Caltrans Facility and Specialized Storm Water Runoff Characterization Monitoring Site Locations During 2001-02 Wet Season.

Total Monitoring
Stations = 122



Consistency in Caltrans Monitoring

All Monitoring Studies Follow Caltrans:

- Storm water guidance manual
- Data reporting protocol
- Data validation software
- Data analysis tool
- Hydrologic tool

Summary of Facility-Based Monitoring Sites During 2001-02 Monitoring Season

Facility	No. of Sites	District	SWQRB
Highways	51	1,2,3,4,5,6,8,9,10, 11,12	1,2,3,5,6,7,8,9
Construction	6	3,4,8,11,12	5,8,9
MS	19	1,3,4,12	1,2,5,8
P and R	13	3,4,7,8,10,12	2,4,5,8,9
Rest Area	3	2,5,6	3,5
Congested/Free Flowing	4	8,11	9
TP/WS	4	4,11	5,9

Summary of Specialized Monitoring Sites During 2001-02 Monitoring Season

Facility	No. of Sites	District	SWQRB
Litter	40	6,7	4,5
First Flush	6	7	4
Herbicide	30	1,2,3,4,5,6,8,9,10, 11,12	1,2,3,5,6,7,8,9
Toxicity	30	1,2,3,4,5,6,8,9,10, 11,12	1,2,3,5,6,7,8,9
Pathogen	14	7,8,11,12	4,8,9

Typical HWY Monitoring Station



@001114201339N3742506W12020007G

Typical Monitoring Station in Lake Tahoe Basin



Tahoe Basin Monitoring Station in Operation



Automatic Monitoring Equipment



Analytical Constituents Monitored

■ Conventionals

- pH, Temperature, Conductivity, TSS, TDS, Hardness, DOC, and TOC

■ Nutrients

- Ammonia, Nitrate, TKN, Total P, Dissolved P, Ortho Phosphate

■ Total and Dissolved Metals

- As, Cd, Cr, Cu, Pb, Ni, and Zn

■ Organics

- Pesticides, Herbicides, VOCs, SVOCs

■ Oil and Grease

Research and Monitoring Cost

- Cost of monitoring per station per event ranges from \$5000-\$10000, depends on the site location and characteristics. This cost include everything from equipment, installation, lab analysis, data QA/QC, data reporting, and report preparation.
- Annually, research and monitoring effort cost about \$6 to \$8 millions.

Preliminary Results: Highway Runoff Characteristics

Constituent	Unit	Mean Concentration		
		1998	1999	2000
Hardness	mg/L	37	56	69
TSS	mg/L	94	121	162
TDS	mg/L	85	NA	117
Cu	µg/L	22	137	62
Pb	µg/L	23	154	69
Zn	µg/L	130	288	240
Total P	mg/L	0.3	0.6	0.3
TKN	mg/L	1.8	2.1	3

Preliminary Results: Maintenance Station

Constituent	Unit	Mean Concentration		
		1998	1999	2000
Hardness	mg/L	19	24	33
TSS	mg/L	55	84	120
TDS	mg/L	41	67	60
Cu	µg/L	11	47	23
Pb	µg/L	9	35	44
Zn	µg/L	123	237	210
Total P	mg/L	0.16	0.37	0.26
TKN	mg/L	1.07	1.77	1.72

Preliminary Results: Park and Rides

Constituent	Unit	Mean Concentration		
		1998	1999	2000
Hardness	mg/L	31	21	25
TSS	mg/L	45	76	55
TDS	mg/L	56	NA	NA
Cu	μg/L	14	19	14
Pb	μg/L	6	14	10
Zn	μg/L	108	189	114
Total P	mg/L	0.35	0.46	0.28
TKN	mg/L	2.1	2.9	1.7

Preliminary Results: Construction Sites

Constituent	Unit	Mean Concentration		
		1998	1999	2000
Hardness	mg/L	107	124	135
TSS	mg/L	259	828	485
TDS	mg/L	105	320	320
Cu	µg/L	45	40	30
Pb	µg/L	89	59	23
Zn	µg/L	179	200	109
Total P	mg/L	0.64	1.5	1.02
TKN	mg/L	2.7	2.1	1.8

In Summary

- Caltrans initiated the statewide monitoring program to satisfy NPDES permit requirements.
- Caltrans monitoring program is fairly extensive and conducted in a consistent manner.
- Nearly all types of Caltrans facilities are monitored for runoff characterization.
- Some variations exist between runoffs within different facilities and on a seasonal basis. However, no alarming differences were noticed.
- Caltrans plans to continue storm water runoff monitoring characterization upon budget availability.